ELG2336

Introduction to Lab

General info

- Lab sessions
  - **Lab:** Tuesday–Session 1 (CBY B302: 09:00–10:00); Session 2 (CBY B302: 13:30–14:30) (Starts 09 Jan 2012)
- Possibly extending 15 min
- Tas
  - Mahfuz (mmahf050@uottawa.ca)
  - ??
- 4 Labs 15% of the final mark
- Lab reports due date
  - One week after each lab
  - Two weeks for each lab

In the Lab

- Three students in the same group
  - Find partners before you come to the lab
  - The names of the groups should be received by Tuesday 10 January 2011.
- From the same session
  - Your responsibility if change sessions
- Attendance for all group members
  - We sign the experiment results sheet as attendance
  - You have to two weeks to get your experiment results checked
  - If finish early, may skip the next week!
  - We are there to help, take advantage !

Scoring of the lab componets

- Prelab – 5
- Participation (lab work) – 5
- Report – 5

- Each lab will be scored on a total of 15

- Labs will contribute to 15% of the course.

Pre-lab (Multisim simulation)

- In the first part (pre-lab) all students "must" perform and analyze the pre-laboratory work **individually** in the electronic simulation software ***Multisim*** to learn how the laboratory circuit would perform. Students should also have their pre-lab *Multisim* simulation results scored by the TA. **The pre-lab results have to be submitted by each student, not by groups.** Please note that students will **NOT** be allowed to do the laboratory if their pre-lab works are not submitted on the day of the lab before starting the experiment with real circuit. **Please note that it is the student's responsibility to learn and simulate the circuits by *Multisim* software.** All the computers in the lab have the *Multisim* software installed.

Participation (lab work)

- In the “participation” component each group would complete the experiment with real circuits. This includes recording measurements and verifying the results experimentally.

Lab Report

- In the last part (report) of the lab, students must submit a report of the lab works. In the report each group should attach the "**checked**" pre-lab analyses along with the recorded measurements and results of the experiment. Laboratory reports should be submitted per group but pre-labs should be submitted per student.
- In the lab report you should discuss the results of the experiments and compare the results with the theoretical results if possible by solving the circuit. You should also include any important observations and any reasons for the errors observed.

A Standard Lab Report

- A standard laboratory report should have the following sections:
  - objectives,
  - introduction,
  - equipment,
  - results,
  - analysis and discussion of the results, and
  - answers to any questions asked.

In the Lab

- 5-10 min tutorial
- Arrive prepared
- Return breadboard and other components at the end
- Power off the equipments
- Clean your desk
- Do not waste time
- **Make sure you get the TA sign on your "completed" lab works before leaving**

Lab reports format

- No copying from Lab Manual
- 5 steps
  - Problem identification/ experiment goal (abstract)
  - Gathering information
  - Experiment
    - Implementation
    - Measurement
  - Multisim (software testing) – MUST be before the experiment! (No lab will be allowed unless Multisim prelab is submitted before starting the experiment)
  - Conclusions – explain sources of errors, findings, etc.

Lab reports format

- Focus on measurements
- CALCULATE experiment errors
- Accurate graphs
  - Name and unit on all axis
  - Hand drawn graphs have to make sense in scale
- Answer all questions
- Concise yet Precise!
- No need to explain in the procedure in the report.

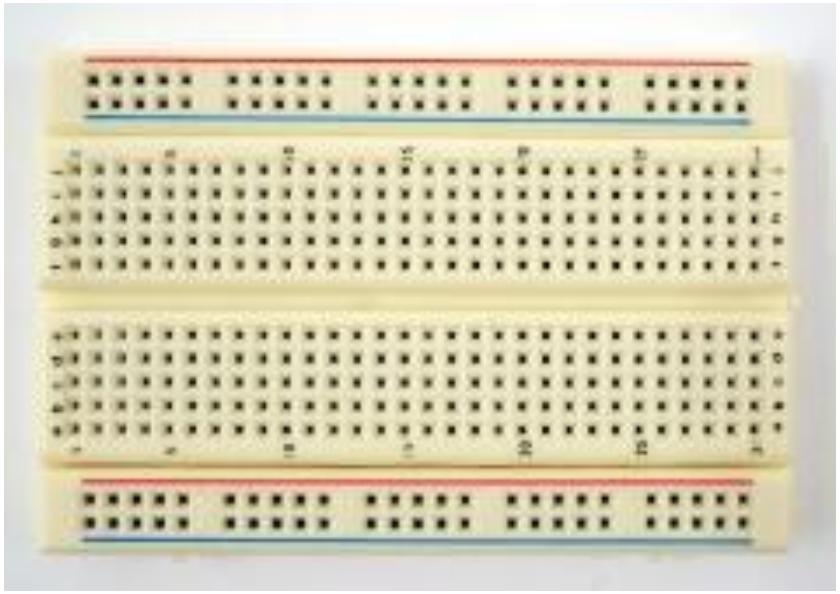
Lab reports

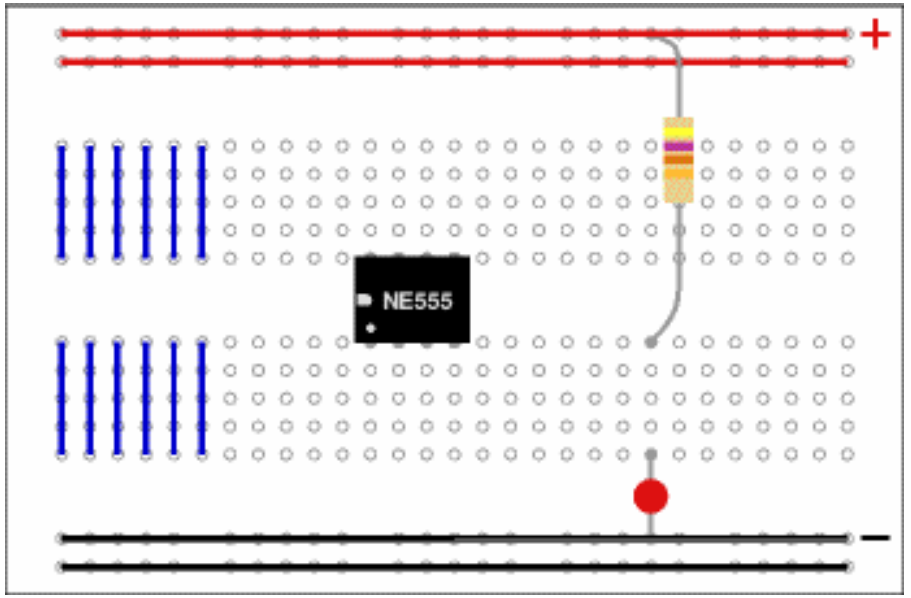
- Experiments + multisim
  - Attach signed multisim prelab with your report.
- Pictures from the screen
  - Save the graph
  - Or print screen, save in Paint then include in the lab report
- Graphs from oscilloscope
  - Camera phones (take a shot)
  - Resolution to read the axis
  - Include selections or settings on the scope
  - Be scientific!!!

Lab reports submission

- Electronically via email by midnight the week after each lab
- .doc or .docx only
- Zero tolerance for copying results
- Please follow uOttawa plagiarism guideline while preparing your report. Be careful about plagiarism.

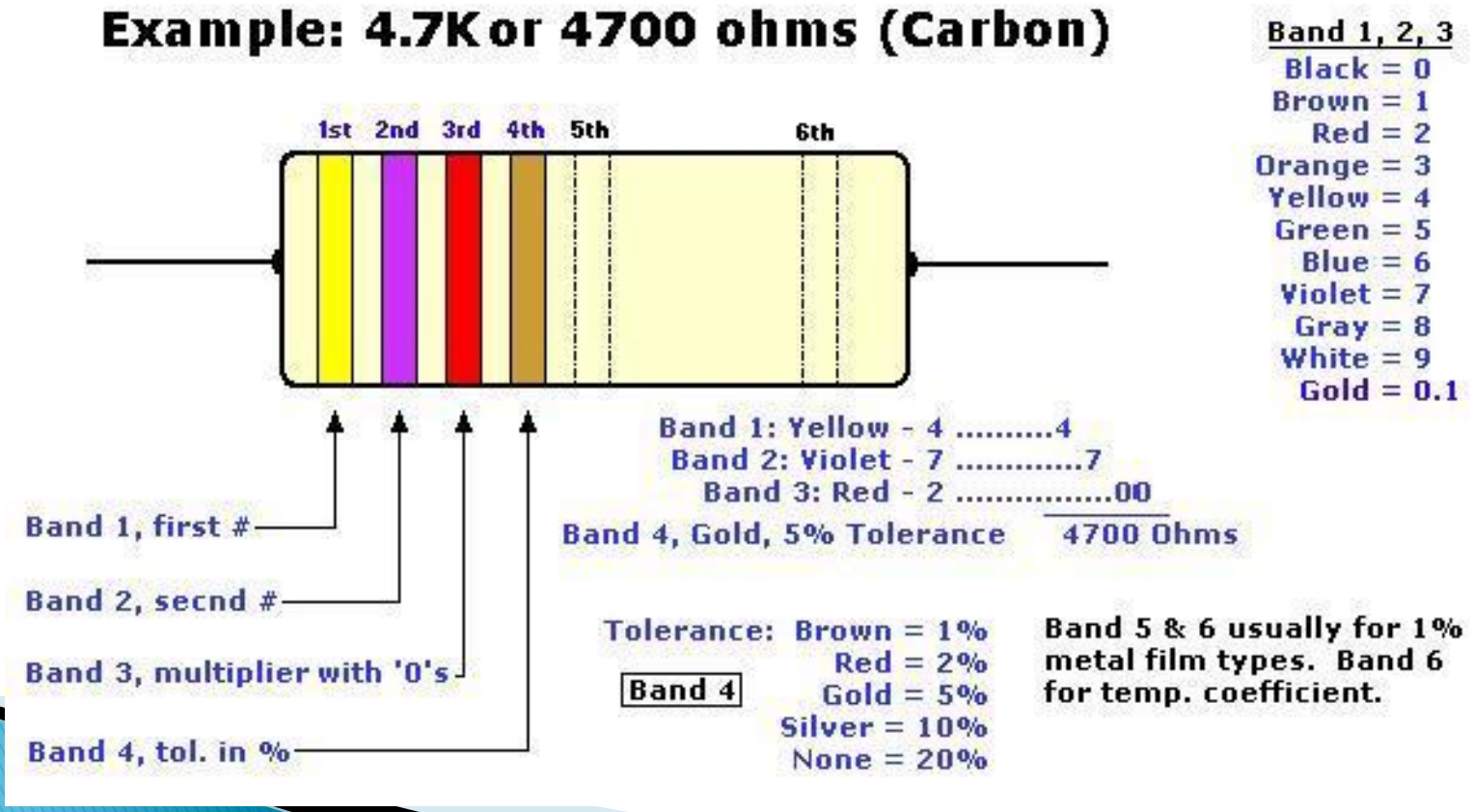
Breadboard



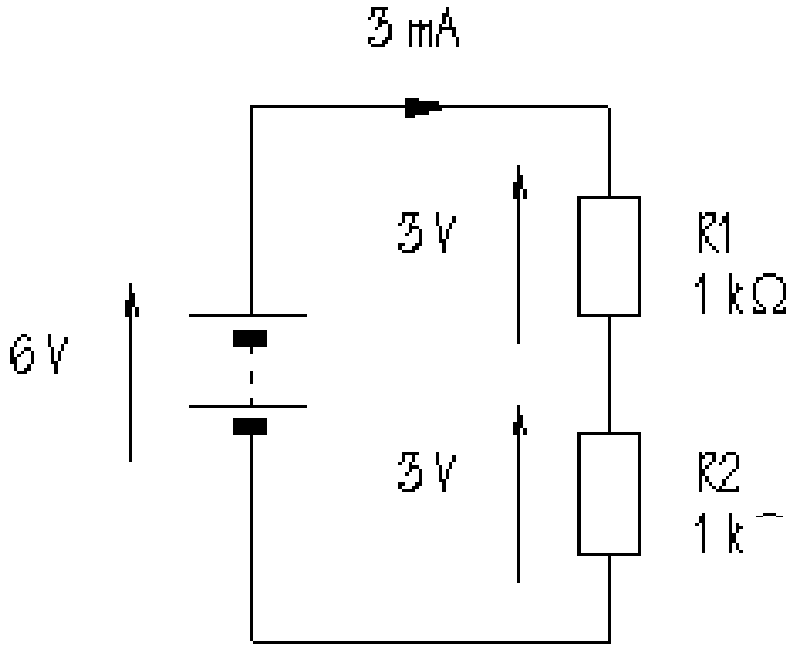


Resistor

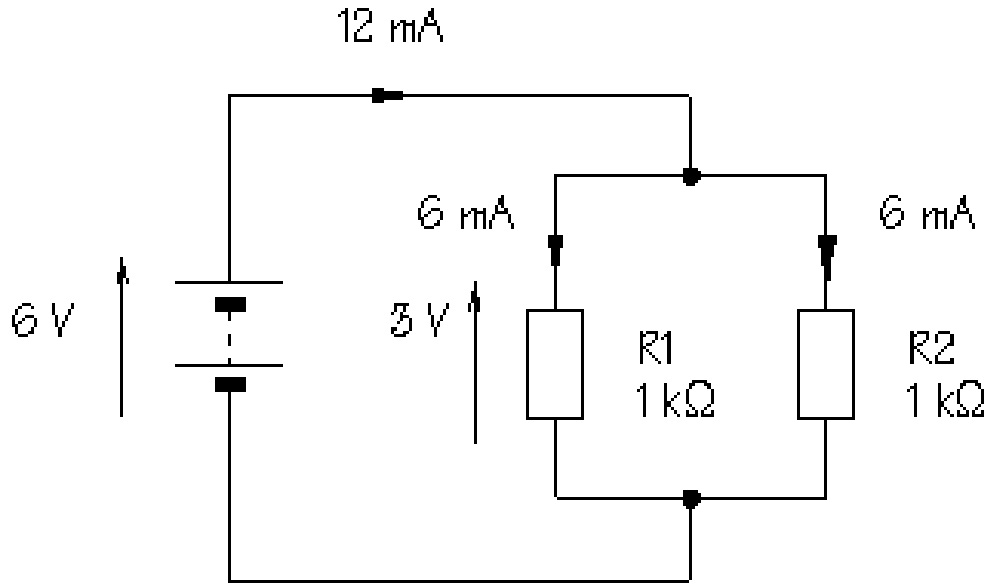
- Resistance (ohm Ω)
- Two terminal electrical component
- R=V/I (volt/amp)



Series/ Parallel Connection



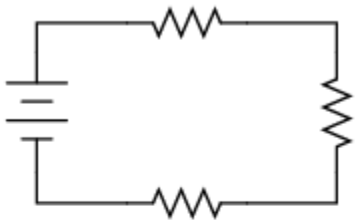
Series



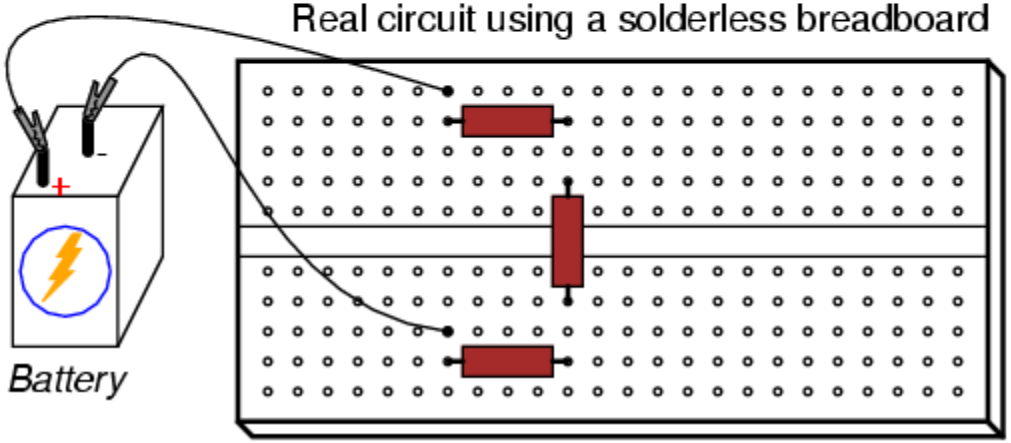
Parallel

Series Connection on BB

Schematic diagram

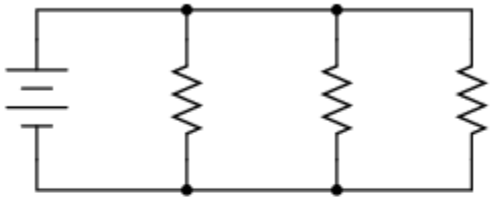


Real circuit using a solderless breadboard

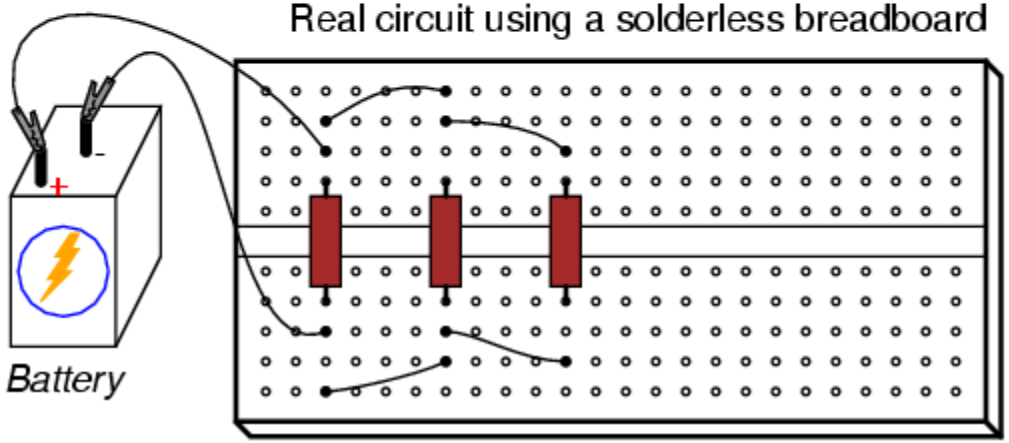


Parallel Connection on BB

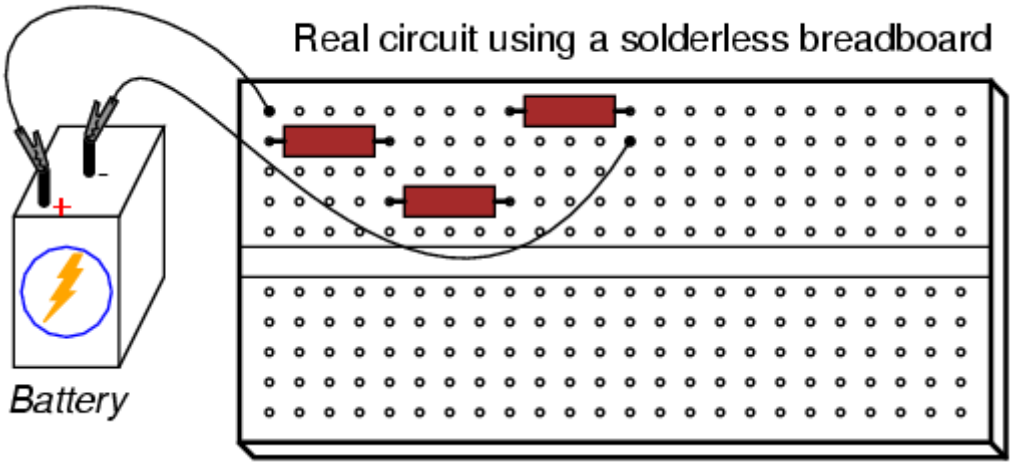
Schematic diagram



Real circuit using a solderless breadboard



Series or Parallel?

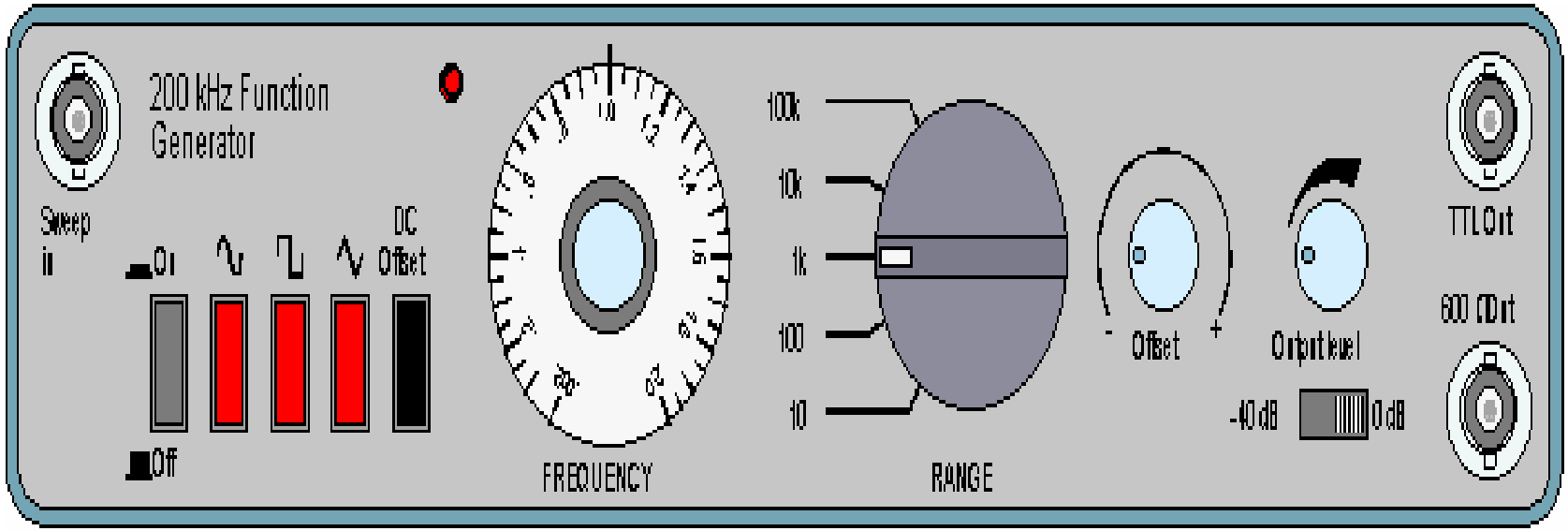


Power Supply

Function Generator

To generate AC signals

- Shape
- Amplitude
- Frequency

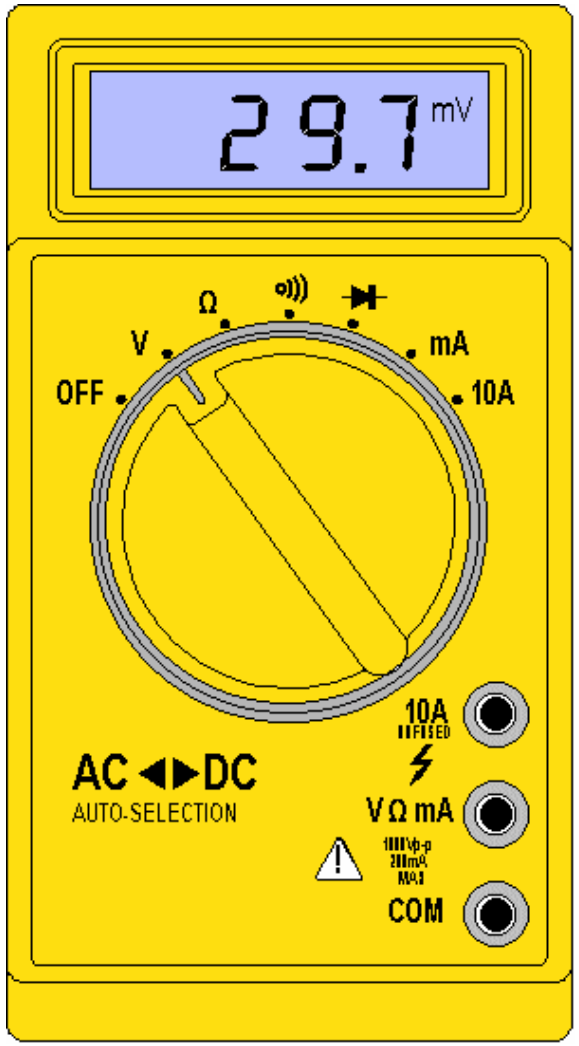


Measurement Devices

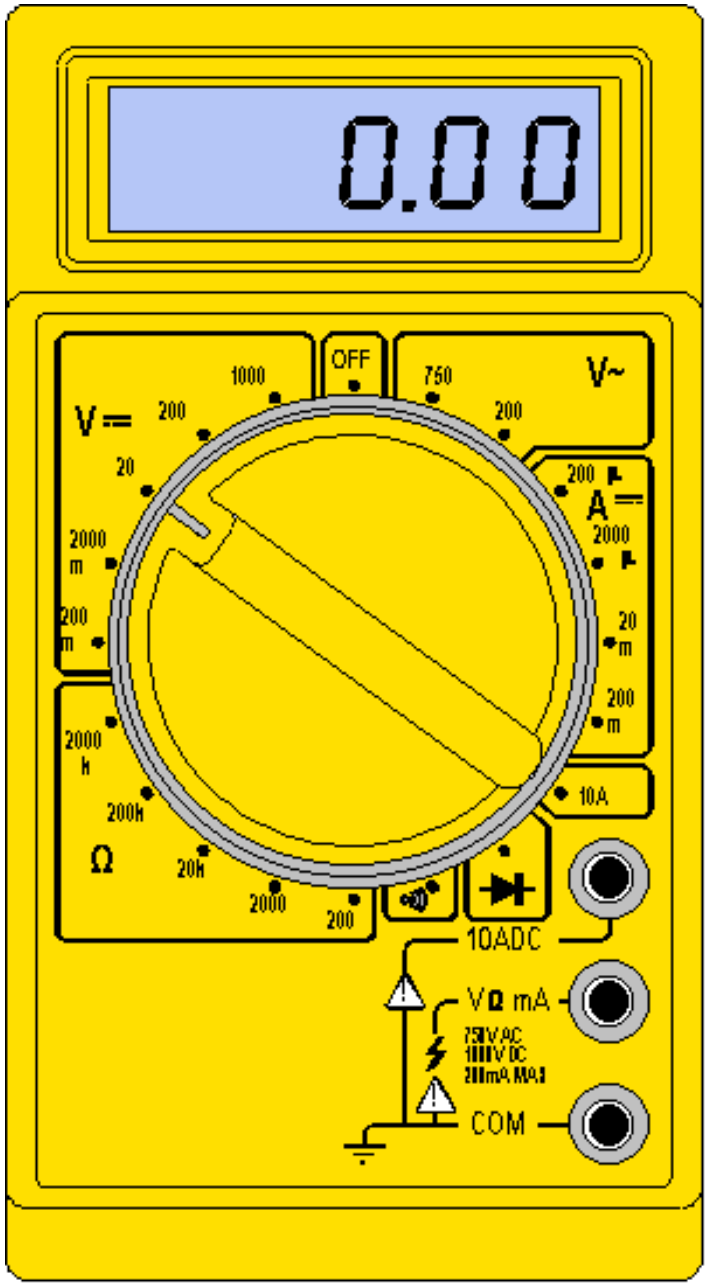
- Digital Millimetre
  - Only DC (or rms)
  - Voltmeter
  - Ammeter
  - Ohmmeter
  - Short circuit check
- Oscilloscope
  - Voltage AC, also DC
  - $R = V/I \rightarrow I = V/R$

DMM

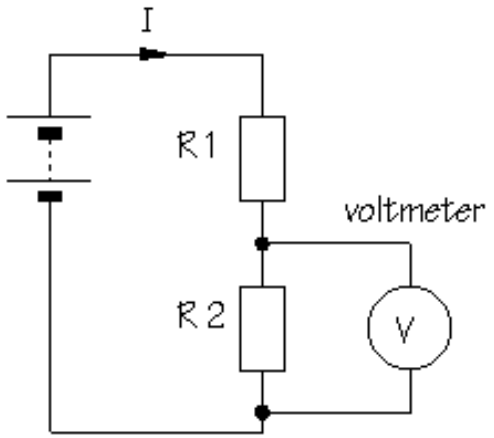

VC1010
FUNCTION GENERATOR

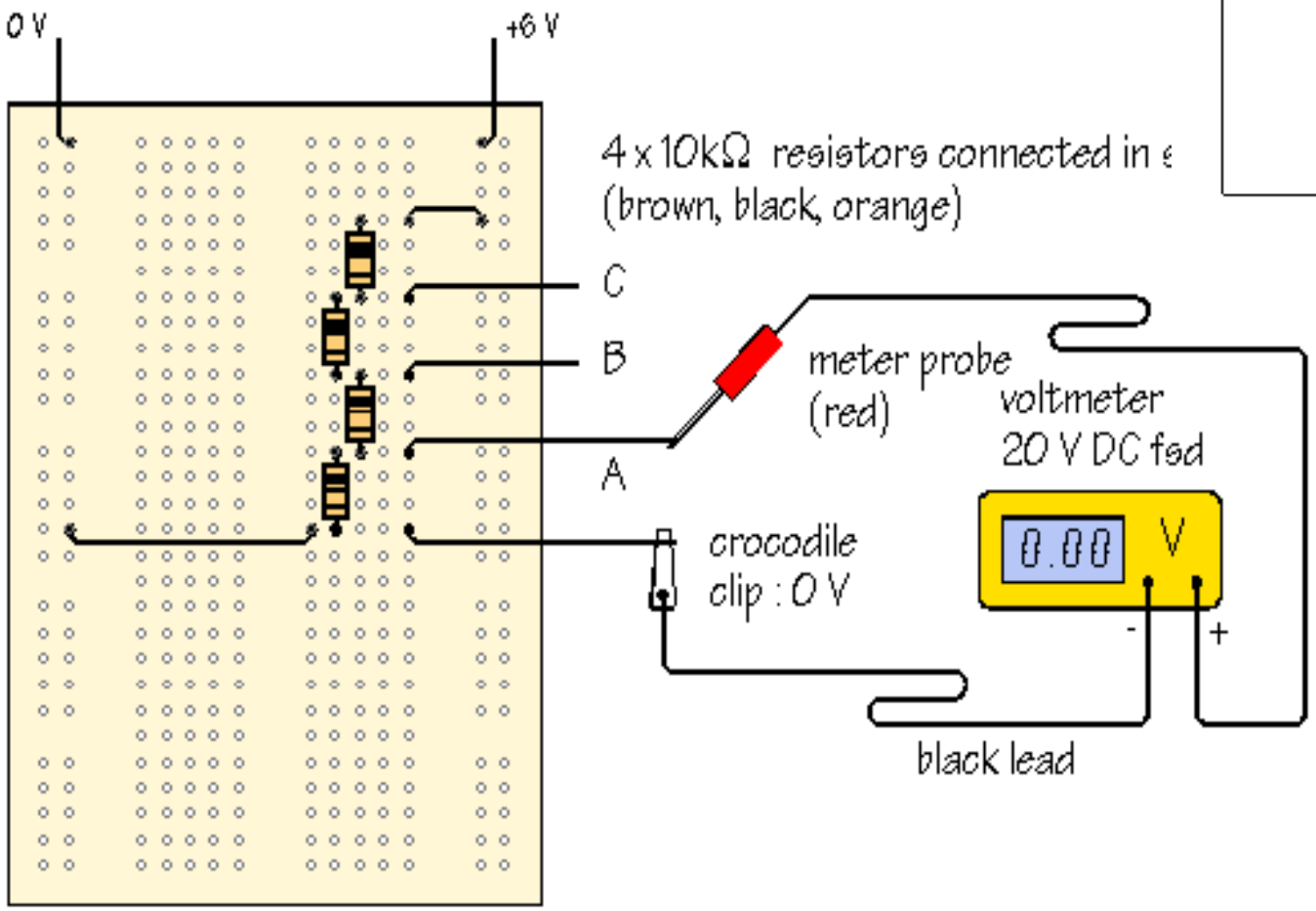

29.7 mV
OFF
V
Ω
mA
10A
10A
FUSED
AC ◀▶ DC
AUTO-SELECTION
V Ω mA
COM

DMM

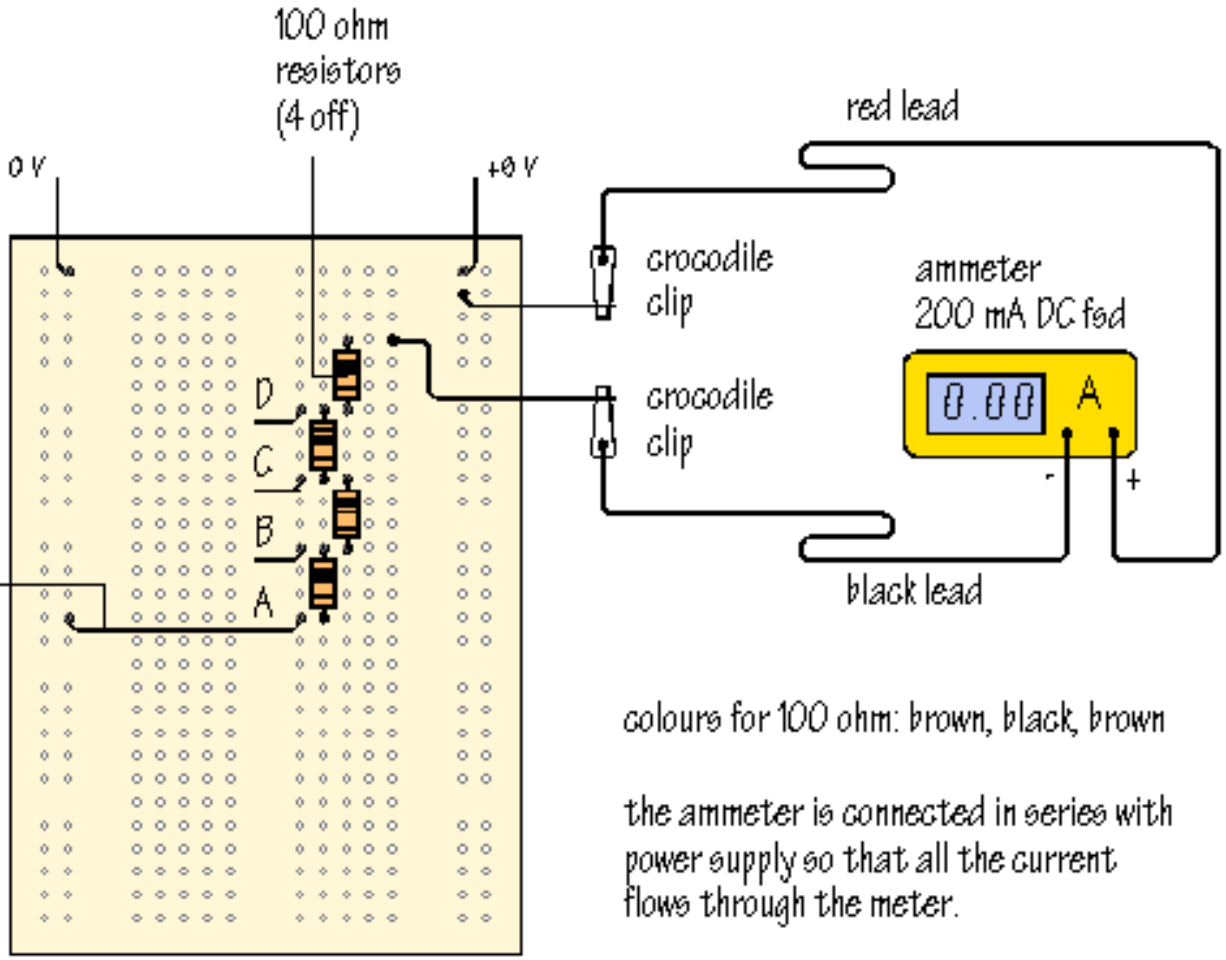

0.00
OFF
V~
750
200
1000
V ⎓
200
20
2000
m
200
m
200
A ⎓
2000
20
m
200
m
2000
k
200k
20k
2000
200
Ω
10A
10ADC
VΩ mA
COM

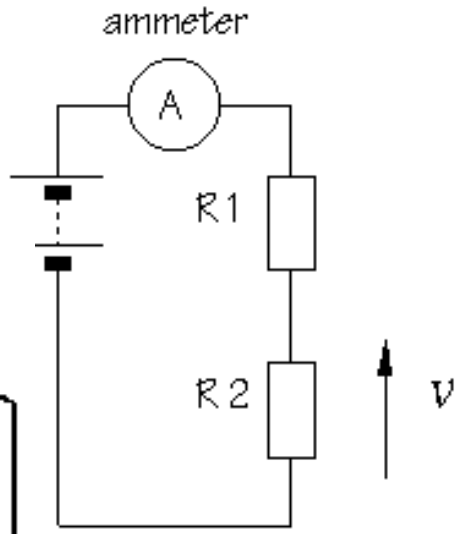
Measure Voltage





Measure Current

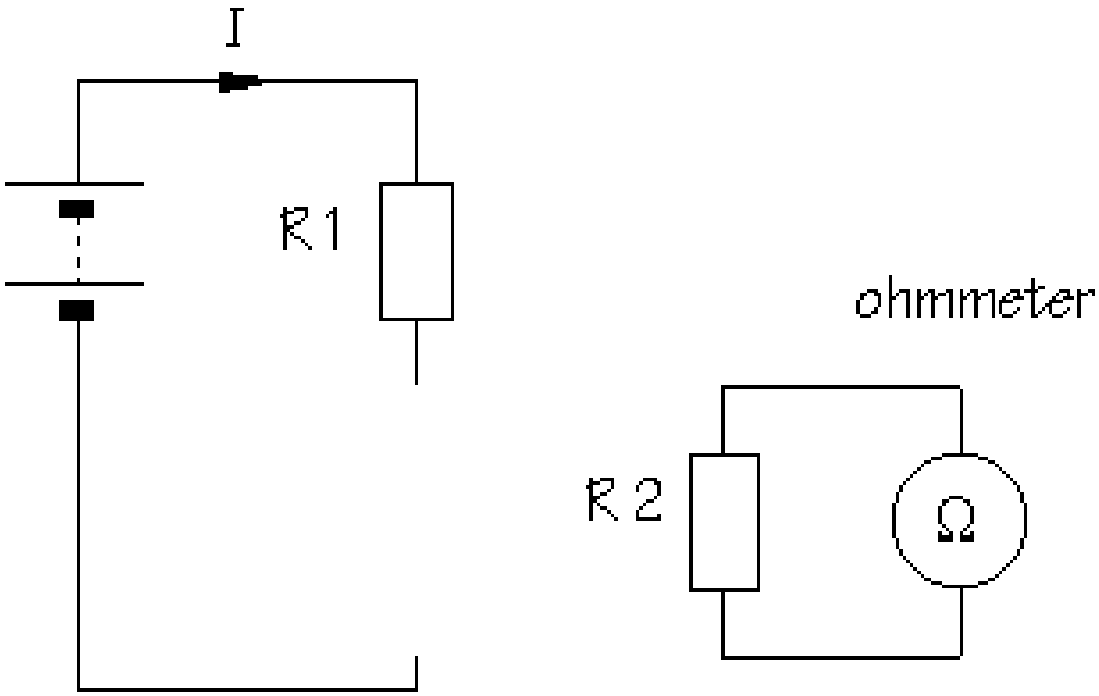




colours for 100 ohm: brown, black, brown

the ammeter is connected in series with power supply so that all the current flows through the meter.

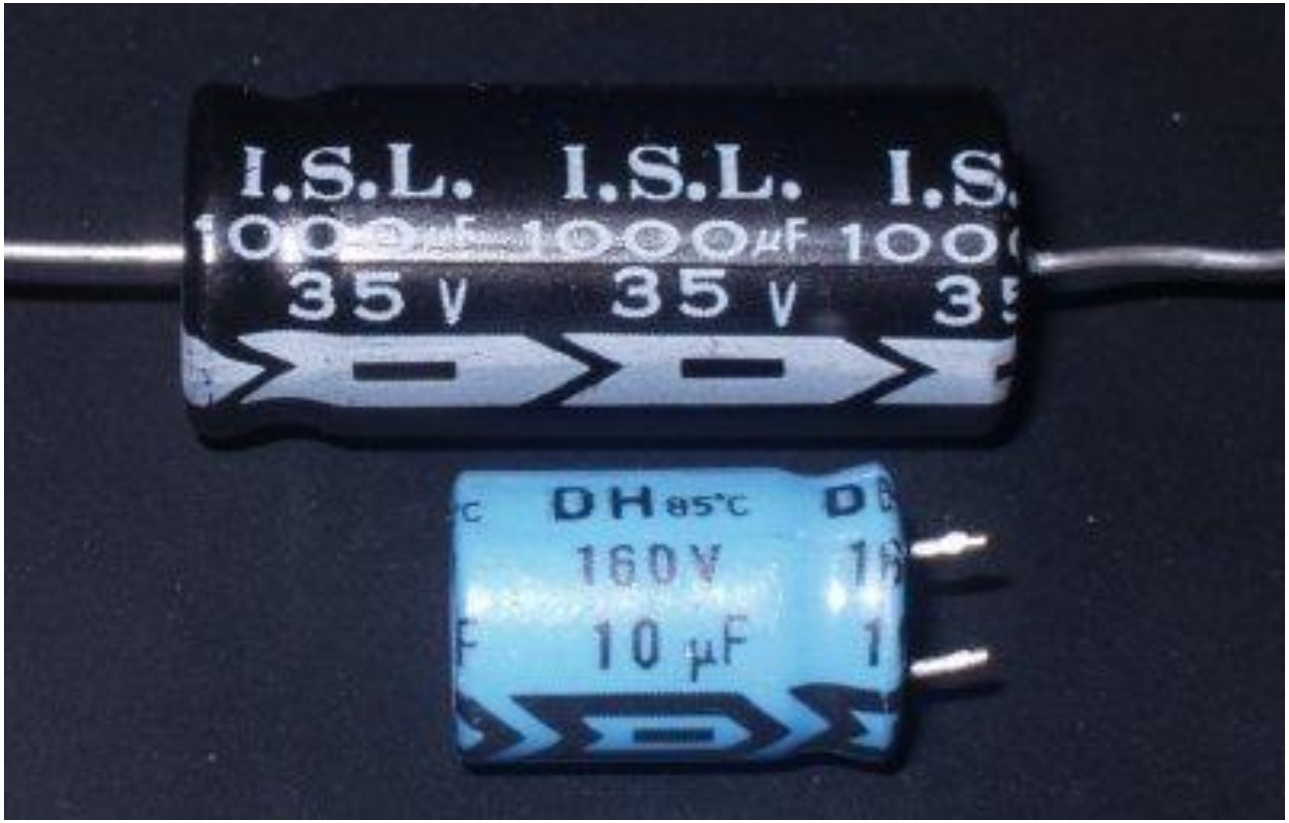
Measure Ohm



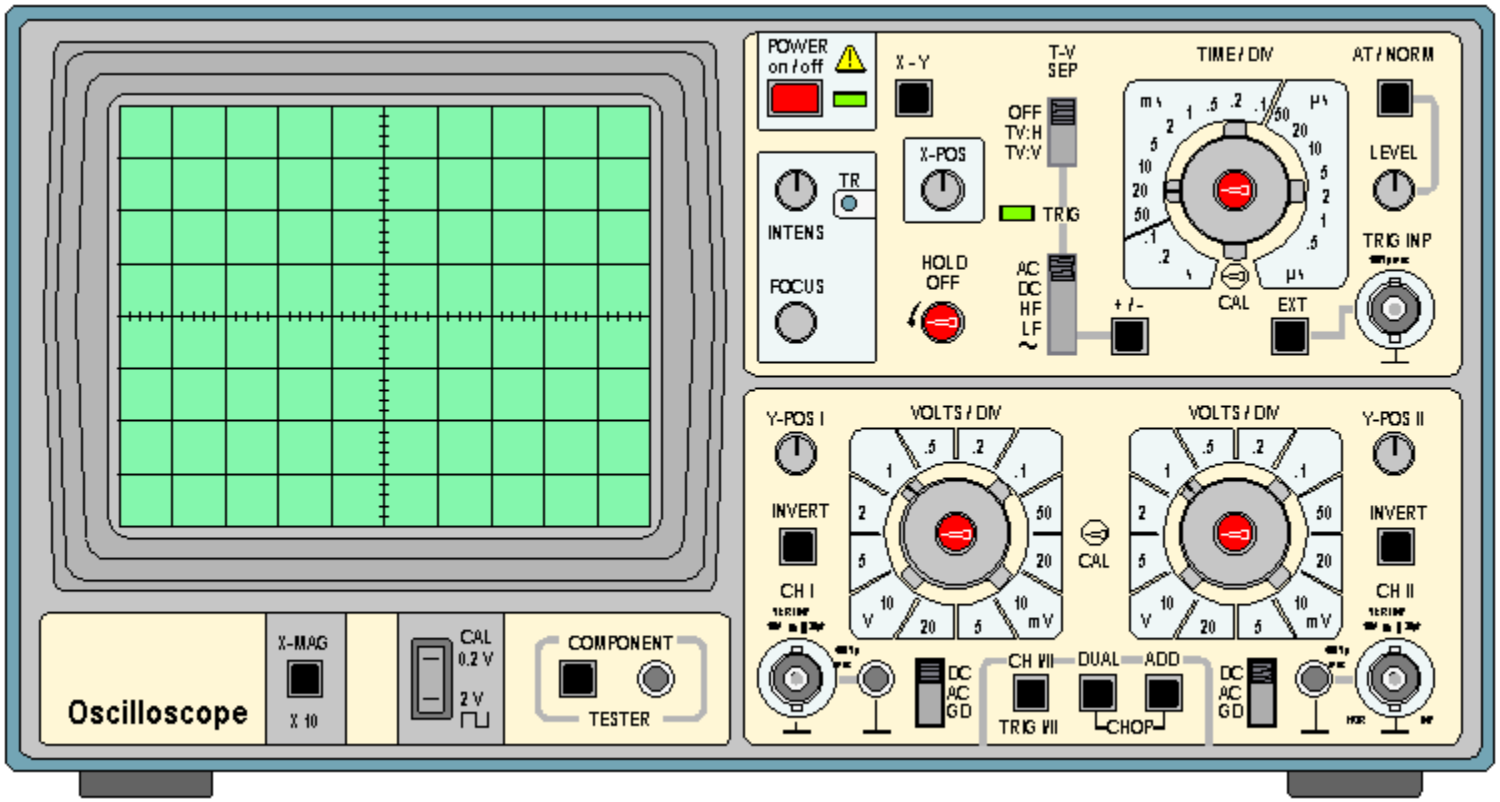
Capacitor

- Capacitance (farad)
- i = C dv/dt
- Reading capacitor
  - Pico farad 1e-12 (10^-12)
  - 151 = 150 pf
  - 105 = 10 x 10^5 pf = 1 uf
- Polar capacitors
  - Look for sidebar (negative)

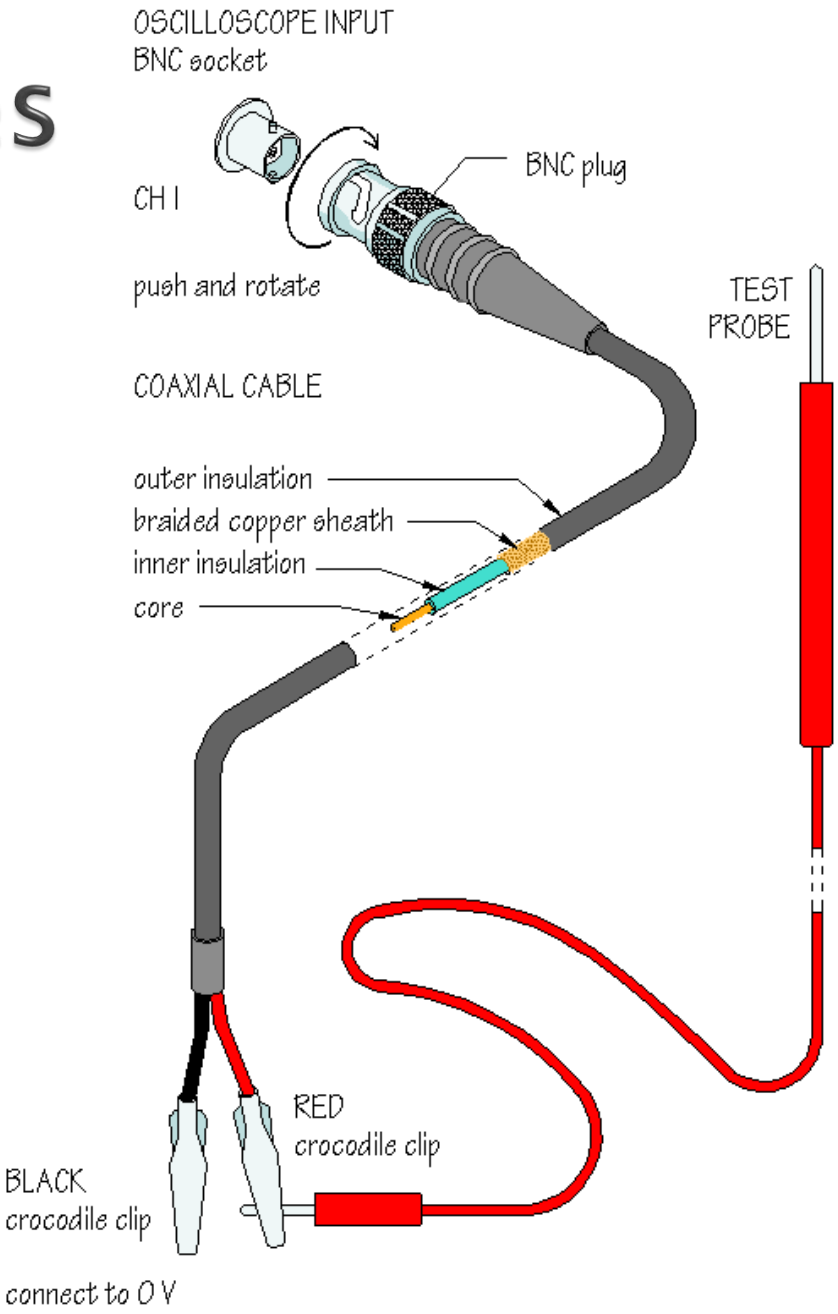
Polar Capacitor



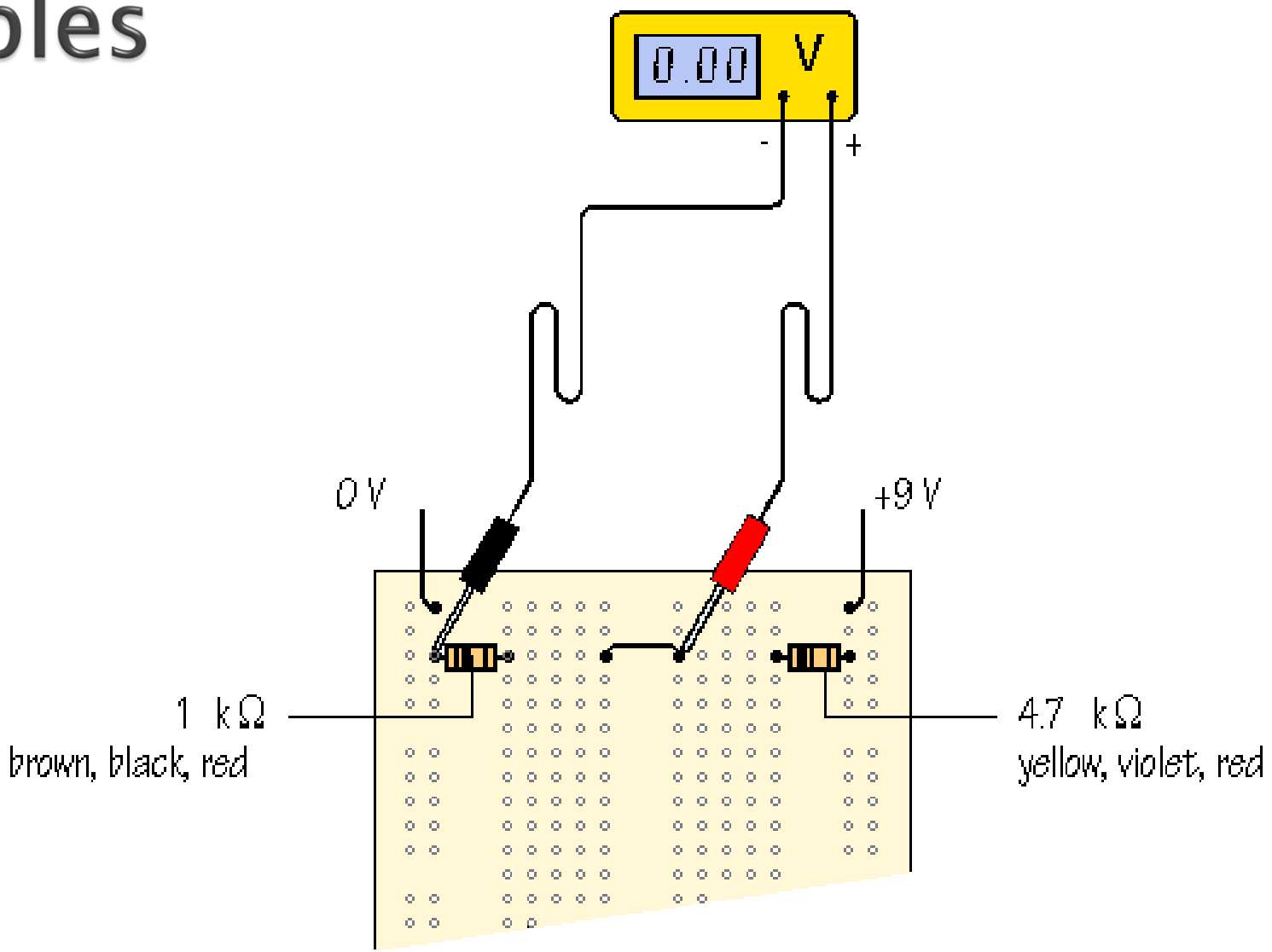
Oscilloscope



Cables vs. Probes



Cables



Coaxial Cable